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ABSTRACT

Following a review of the literature, the paper describes a total communication approach to the language development of a 4-year-old autistic child. It is explained that the child was videotaped while being trained to simultaneously use elements of American sign language together with the correct spoken word or words. Training procedures are described for nouns, verbs and noun-verb pairs. Among results analyzed are a drastic reduction of verbal echolalia, a marked increase in simultaneous vocal and signed labeling, an increase in unprompted vocal labeling, and increases in simultaneous vocal and signed telegraphic phrasing. Followup evaluation is noted to have shown a continued low level of echolalic production and continued high percentage of both prompted and unprompted vocal labeling. (CL)

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THE DEVELOPMENT OF LANGUAGE BEHAVIOR IN AN AUTISTIC CHILD USING A TOTAL COMMUNICATION APPROACH

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STATEMENT OF THE PROBLEM

Many workers in the fields of psychology and special education, have observed the behavior of children diagnosed as autistic and all have become exceedlingly impressed with the importance of language problems in the etiology of the autistic syndrome. Rutter (1971) states that infantile autism is a syndrome present from infancy in which three features dominate:

1. Failure of social development
2. A development of various ritualistic and self-stimulatory behaviors
3. Deviant and delayed language development

Kanner (1946) focused on manifestations of serious language impairment such as echolalia, metaphoric substitution, the use of analogy, substitution of parts for the whole, or whole for the parts, pronomial reversals and mutism.

Many researchers (Wing, 1970; and Hermelin and O'Conner, 1970) support the view of Rutter (1971) who contends that the basic disorder found in autism must involve symbolic language functioning, but need not involve any other handicaps. Rutter (1972) went on to further state that the psychogenic factors probably play no essential role in the causation of the basic disorder found in autism. They are, however, likely to be important in their effect on the course of the disorder.

As a result of the emphasis presently being placed on linguistic development in the etiology of the autistic syndrome, educational and

therapeutic strategies have begun to place a strong emphasis on the development of speech in the autistic child.

REVIEW OF THE LITERATURE

The last decade has seen a rapidly growing number of studies focusing on language training of psychotic children. The question of language training for these children has generated considerable controversy. While behavioral psychologists (Skinner, 1957) have described language as a unique class of operants, linguists (Chomsky, 1959) emphasize that the ability to use language is an innate characteristic.

Yule, Berger, and Howlin (1957), however, state that the important issue is not whether language is an innate capacity. They declare:

> We are not arguing against the importance of biological factors in language. The evidence for their relevance is clear. Nor are we arguing that all children acquire their language through reinforcement. What we do maintain is that some language deficient children do improve their performance after the application of behavior modification techniques. Whether they learn language or to make use of language they already have is irrelevant to treatment. P. 219.

These authors state that when speech is merely delayed, training should follow the normal developmental sequence, but where speech is deviant, more radical departures may be necessary. It is certainly possible that information from both linguistics and behavior modification should be used in developing training programs for children with severe speech deficits.

Ferster and DeMyer (1961) are generally credited with the introduction of operant conditioning techniques to the study of psychotic children. They exposed autistic children to a highly controlled environment, consisting of a room full of vending machines,

where the children could learn relatively simple behaviors, lever pulling, for reinforcement which was shown to be functional in maintaining these behaviors over time. This result had a two fold significance. It demonstrated that (1) an autistic child's behavior could be related lawfully to environmental contingencies, and (2) that an autistic child could be taught to comply with reality.

DeMyer and Ferster (1962) later employed operant techniques in a more flexible fashion with eight autistic children, age two to ten, in a residential setting. Pleasure producing adult-child contact was first used to establish the adult as a "reinforcer" and then used to reinforce specific elected behaviors.

In another of the early studies, Wolf, Risley and Mees (1964) employed the techniques of shaping, extinction and time-out from reinforcement to treat Dicky, a three year old autistic boy who would not eat properly, was self-destructive, and refused to wear his glasses. A follow-up study done by Wolf, Risley, Johnston, Harris, and Allen, (1967) demonstrated that the initial results obtained could be continued after discharge from the hospital provided that Dicky's parents were trained to be his primary therapists at home.

Lovaas, Schaeffer, and Simmons (1965) employed electric shock in an attempt to promote social behavior in autistic children. They theorized that if a child associates an adult with relief from pain, the adult will acquire secondary reinforcing value to the child. The children learned well, but a generalization of training proved a problem.

The importance of imitation for learning and socialization in early childhood has long been recognized. Bandura (1969) has pointed

out, that the learning of complex behaviors would be extremely difficult if each small detail of a behavior had to be acquired separately. It would be extremely difficult for a young child to develop complex language ability, without his first having developed the general ability to imitate sounds.

Metz (1965) like many others before him recognized that children diagnosed autistic typically do not imitate other people. As a result, Metz attempted to employ operant conditioning techniques to teach two autistic children generalized imitative behavior. The children were seen six days a week for one-half to three-fourths hour after being deprived of breakfast. In the preliminary training period, the word "good" and tokens were established as secondary reinforcers. This was particularly valuable for shaping new behavior, where it was necessary to capitalize immediately upon fleeting variations of behavior. Next, shaping procedures were employed to train a repertoire of paired tasks in which the same materials were used for each pair. A task was considered learned if the subjects imitated it correctly, without any help, six times in a row when presented in a series with five other tasks. Results indicated that (1) autistic children can learn to imitate, (2) the learning can generalize to similar but new behaviors without specific training, and (3) the generalized imitative response can persist, in a context of reinforcement of other imitative behavior, without specifically being reinforced.

Hewett (1965) was one of the first investigators to use a psycholinguistic framework and behavior modification techniques in teaching speech to a nonverbal autistic boy five years of age. Hewett used food rewards to condition the youngster to eye contact with another

human being. Following the development of that level of attention, he then moved to a second phase of social imitation where the child would imitate gestures and human movements. The third phase required the use of expressive language to obtain food reinforcement, and finally to transfer those expressive skills to other situations. Hewett was able to produce a 32-word working vocabulary in this child over a period of six months.

Lovaas, Berberich, Perloff, and Schaeffer (1966) developed what was then a new method for teaching imitative speech within an operant conditioning framework. The training procedure consisted of rewarding the children for increasingly finer verbal discriminations and reproductions of the attending adult's speech. The steps in the teaching program included: (1) establishment of proper conditions under which imitation of verbal sounds would take place, i.e., reduction of self-stimulatory and self-destructive behavior, (2) rewarding all vocalizations and visual fixation on the adult's mouth by the child, (3) rewarding the child only if he vocalized within six seconds of the trainer's vocalization, (4) rewarding only if the child's response matches closely the adult's vocalization, (5) teach the discrimination of two sounds or words. Training was conducted six days a week, seven hours a day, with a 15 minute rest period accompanying each hour of training. Rewards, in the form of single spoonfuls of the child's meal, were delivered immediately after correct responses. The results of the first 26 days of training indicated that (1) both autistic children learned to imitate new words, (2) as training progressed, the rate of mastery increased, and (3) a deterioration in imitation behavior was noted whenever rewards were shifted

from response-contingent to time-contingent delivery.

Risley and Wolf (1967) describe in great detail a training program for the development of verbal labeling behavior in four psychotic children who were echolalic. They discuss the importance of the physical arrangement of the room; distractions should be kept to a minimum; the room should only contain two chairs, a table, and a food tray. The furniture may be bolted to the floor if necessary. The choice of appropriate primary reinforcers is also discussed. Food rewards should be those that the child likes, that are difficult to play in, that can be delivered in very small quantities, and that disappear quickly from the mouth. Ice cream is mentioned as a particularly successful reinforcer. All food reinforcers are more effective if used when the child is in a state of mild deprivation. The food is held in front of the trainer's face in order to establish attending behavior and is always paired with social reinforcement.

Inappropriate behavior is handled using a time-out procedure. When the child is disruptive or displays inappropriate echolalia, the trainer looks away. If the inappropriate behavior is severe or prolonged, the trainer leaves the room, taking the food tray with him, or the child is removed to an adjacent room. Training continues when (1) a set time period has elapsed and (2) the child has not engaged in the disruptive behavior for a short period of time. Risley and Wolf stress, that the effectiveness of these procedures is dependent upon the strength of the positive reinforcer which is being withheld.

Once contingent reinforcement has produced a high probability of successful imitation with a short latency period following each verbal prompt, the transition from imitation to naming can be accom-

plished. The therapist holds up an object and says, "What is this?" When the child attends the answer is immediately prompted and the child is rewarded for imitation of the prompt. Gradually, the prompt is faded out. Imitation of the question is timed-out.

In an experimental investigation of their method, Risley and Wolf determined that verbalization was functionally controlled by the reinforcers and that food and praise was 50% more effective than praise alone. A positive acceleration of learning over time was also noted. The authors suggest that in order to maximize generalization, words that have functional meaning to the child should be taught, and the parents should be trained in this method for use at home.

In a discussion of generalization among the twenty children trained in his program, Lovaas (Lovaas, Koegel, Simmons, and Long, 1973; Lovaas, Schreibman and Koegel, 1974) reports that there are great individual differences among the autistic children treated. When comparing children who returned to their parents versus those returning to institutions after treatment was terminated, Lovaas found that the children who are institutionalized subsequent to treatment show virtually no generalization; indeed, most show significant regression. The children who returned to their parents (previously trained in the therapeutic techniques) maintained their gains or improved further. For the children who regressed in institutional settings, a brief reinstatement of the behavior therapy could temporarily reestablish the original gains. Thus, Lovaas concludes (Lovaas et. al., 1974) that it does not appear to be enough to help the children acquire appropriate behaviors and to overcome the inappropriate ones; it is also important to provide maintaining conditions which ensure

that the improvements will last.

After the training of imitation and labeling behavior, the next logical step in a developmentally based language training program would be the acquisition of grammar-syntax. The expression of grammatically correct sentences requires a large repertoire of verbal chains of responses with different and interchangeable features. The problem is complicated by the fact that children will speak grammatically correct sentences even though those sentence forms may never have been reinforced or practiced.

This observation has led linguists (Chomsky, 1965) to postulate the theoretical concepts of "generative" grammar, or "rule-generated" language, and to endow these concepts with many neurologically based determinants.

Learning theory conceptualizes this observed flexability and novelty through the concept of "response class". Skinner (1935) considered responses which had different topographies but satisfied a common contingency of reinforcement as constituting a functional response class. The members of a response class are related, in that an operation that changes the strength of one response indirectly alters the strength of the other responses (Bijou and Baer, 1967). This concept allows for the occurrence of behavior which has not been specifically reinforced in the past, provided other responses within the same class have been reinforced.

Salzinger et. al., 1965, observed the language development in one child who was reinforced for the response, "Gimme candy". Subsequently, they observed an increase in the use of the "Gimme _____," response with the whole series of new words and strings of words

without additional reinforcement of these combinations.

Guess, Sailor, Rutherford and Baer (1968) presented data on the acquisition of plurals by a ten year old retarded girl. Employing imitation and differential reinforcement, the child was taught the plural forms of three object labels she had previously mastered in singular form. After training, she correctly generalized the plural form to other object labels without specific training.

Similarly, Schumaker and Sherman (1970) used imitation and differential reinforcement procedures to teach three retarded children to use verbs in the past and present progressive tenses. The basic format of all training consisted of the experimenter presenting a verb to the subject by saying, for example, "Now the man is painting. Yesterday he _____?", or "Yesterday the man painted. Now he is _____?". Verbal praise and a poker chip were given after every correct response. The chips could later be traded for a toy of the child's choosing. Incorrect responses were followed by, "No, that's wrong," and a five-second period of silence after which the same stimuli were presented again. Generalization was demonstrated during probe sessions, in which untrained verbs were interspersed with trained verbs.

Wheeler and Sulzer (1970) present a training procedure in which an eight year old echolalic, autistic child, who spoke essentially in "telegraphic" English, leaving out most articles and auxiliary verbs, was taught to use a particular sentence form which included the articles and verbs to describe a set of standardized pictures. The basic training consisted of combining labels that had already been present in the child's repertoire, in order to teach him the

use of grammatically correct sentences, all of which included subjects, predicates and objects. Each sentence was broken down into three parts (noun subject, verb phrase, object phrase) and taught in a chaining paradigm. In addition, generalization of this response form to a set of pictures that were never trained or reinforced was demonstrated.

Long and Rasmussen (1974) have extended the basic procedure of Wheeler and Sulzer (1970) to include the training of compound as well as simple sentences. The first phase of this procedure consisted of training an eight year old autistic child to use four types of simple sentences to describe a set of standard pictures. The child was required to produce two of these several forms in response to each of the pictures in order to receive reinforcement. In the second phase of the procedure, the child was taught to chain the two simple sentences he had learned in Phase I, using the conjunction "and" to produce compound sentences. The training method in both phases included the use of imitative prompts, differential reinforcement, and time-out for errors. Results indicated that the training procedures used produced a marked increase in the production of unprompted simple sentences in Phase I and a similar increase in compound sentence production in Phase II. In addition, the child's performance on generalization test cards presented at the end of Phase II nearly matched his best performance on the training cards used in Phase II (75% correct).

Similarly, Lovaas (1976) replicated and supported Schumaker and Sherman's (1970) work on training the past tense (ed) as well as the work of Guess et. al. (1968) and Sailor (1971) on the training of plural forms. Lovaas (1976) went on to further demonstrate that

one can prompt and differentially reinforce a child for arranging words into sentences and that as a function of this training, he will then combine new words into grammatically correct sentences.

Finally, Hanblin, Buckholdt, Territor, Kisloff and Blackwell (1971) trained seventeen mute autistic children using operant techniques with a psycholinguistic framework. The children were in training from one to three years. Training procedures began with eye contact and progressed to speech and social behavior. The authors noted that a high success/failure rate eliminated much of the disruptive behavior. Thirty-five percent of their sample acquired functional, linguistic syntax and were successful in regular public schools or in special education classes; 30% acquired some speech and were able to attend laboratory schools. Thirty percent acquired little or no speech. The majority of this last group were institutionalized. An important finding of this study was that only one of the eleven children who began training before age five made poor progress, while five of six who began training after five made poor progress.

Though these studies have reported much success, many problems have arisen. First, many of the procedures described above are time consuming and often relatively unproductive. A second problem is the seeming lack of generalization outside the therapy situation. While many of the studies cited above demonstrated response generalization, (i.e., the extent to which changes in a limited set of behaviors effected changes in the larger range of behaviors included within the same response class) many workers such as Lovaas, Koegel, Simmons, and Long (1973) and Hartung (1970) reported that stimulus generalization (i.e., the extent to which behavior changes that

occurred in the treatment environment transfer to other settings), and maintenance over time (i.e., how long the therapeutic effects last) had to be specifically taught. Finally, while Risley and Wolf (1967) have demonstrated the effectiveness of their procedure in the reduction of echolalia it is often situationally or temporally unfeasible to employ this method when the therapist has limited time or facilities in which to work.

Based upon the above mentioned problems and the data which indicates (1) that autistic children have difficulty with visual and auditory discrimination (Hermelin and O'Connor, 1965; Hingtgen and Goulter, 1967) and particular difficulty with visual-auditory crossmodal associations (Hermelin and O'Connor, 1965, 1967; Bryson, 1970; Davis, 1970; and Lovaas, Schreibman, Koegel, and Rehm, 1971) and (2) that autistic children use meaningful nonverbal gestural communication (Jakab, 1972) the next logical educational strategy would be the implementation of a manual language. This approach would appear to have two advantages -- (1) a manual language is visual and thus eases crossmodal difficulties, (2) a manual language is gestural and would appear to incorporate a strength in the child that is already present.

Fouts (1973) reported that the use of American sign language (Ameslan) generalized spontaneously from the therapy situation to the outside environment. Fouts also reported that the use of Ameslan signs increased the attentiveness of the child to the therapist. Webster, et.al. (1973) reported on a six-year old mute, autistic child who readily acquired a number of signs, and that not only did he learn to respond appropriately to commands given in sign language,

but also he spontaneously used the signs to give others commands such as "sit down". Miller and Miller (1973), employing a program which used elevated boards and sign language reported that all nineteen autistic children acquired and used some signs appropriately to gain desired objects or goals. They also reported that one of the children made the transition from signed language to expressive spoken language while all children learned to respond to words which had been systematically paired with the relevant signs. In a final study, Fulwiler and Fouts (1976) taught elements of American sign language to a five-year-old nonverbal autistic boy. Results after twenty hours of training indicated that the child did acquire signs, that increasing signing led to increasing vocal speech, and that the child has rudimentary English syntax. The use of Ameslan signs spontaneously generalized to other situations and the training resulted in increased social interaction.

The present study attempted to demonstrate the effectiveness of a procedure, employing behavior modification techniques in conjunction with a total communication approach (Schlesinger and Meadow, 1972), in order to train verbal labeling behavior and rudimentary telegraphic speech while simultaneously decreasing the production of echolalia in an autistic child.

METHOD

SUBJECT:

The subject for this study was a four year old girl diagnosed by a child psychiatrist as schizophrenic, childhood type: infantile autism. She was enrolled in a center for severely disturbed children. At the time this study was initiated, the child was exhibiting the following behaviors: (1) poor eye contact which required "look at me" or movement of the child's head to be obtained, (2) infrequent spontaneous social interactions, (3) self stimulatory behaviors such as inappropriate hand regard, and head banging with the hand, and (4) deviant or delayed language development characterized by a high frequency of unintelligible vocalizations, echolalia approximately 90% of the time, and seeming lack of comprehension or verbal response to "what is this?" The child did possess a good receptive vocabulary as evidenced by consistently correct responses to "hand me", or "show me".

SETTING:

Training was conducted in the speech therapy room in the center in which the child attended. The child and the therapist sat facing each other on the same side of a table on which reinforcers were placed. On the floor, beside the therapist was placed a plastic covered screen which concealed the objects used in the training procedure. In order to videotape each of the therapy sessions, this experimenter sat on the opposite side of the table.

MATERIALS:

The stimulus materials consisted of twenty objects which the child would be trained to label. For those objects that were unattainable, i.e , bed, boy, girl, etc., life-like pictures were substituted. The objects were selected based upon their commonality and the high probability that the child would be interacting with them in the future. Items to be used as reinforcers consisted of chocolate chips and bite size pieces of cookies. These were previously deemed effective by the therapist during reinforcer sampling, in which the child's preferences were evaluated.

EXPERIMENTAL DESIGN:

As a result of the limited availability of children exhibiting autistic symptomatology, a modification of the multiple baseline design across behaviors (Sidman, 1960; Hersen, and Barlow, 1976) was employed with the above mentioned subject. During each succeeding treatment phase the same treatment procedure was implemented but, the words to be presented differed. Two follow-up sessions were undertaken following the completion of training. Follow-up I was attempted three months after training, and Follow-up II was attempted approximately nine months after training. The following is a graphic representation of the design.

GROUP I	Nouns 1-10	Baseline	Treatment		Follow-up I	Follow-up II
GROUP II	Verbs 1-5	Baseline		Treatment	Follow-up I	Follow-up II
GROUP III	Nouns 11-20	Baseline		Treatment	Follow-up I	Follow-up II

PROCEDURE:

The child was trained to simultaneously use elements of Ameslan

together with the correct spoken word or words. The signs in Ameslan are analogous to the words in spoken English. Each sign consists of a particular hand configuration and movement, in addition to specific positions relative to the signer's body where the sign begins or ends. The general method of training was similar to the total communication method cited above. The trainer spoke the word while simultaneously demonstrating, molding or prompting the sign. Hence, while Ameslan signs will be used, the syntactical relationships were those of spoken English. The training sessions, which lasted approximately twenty minutes each, were held three times a week.

BASELINE --

During the baseline phase for both groups of ten (10) nouns, the subject was shown the object or picture adjacent to the therapist's own mouth area. The child was given a five second time interval in which to respond and her response was recorded by videotaping. Since the five verbs comprising Group II could not be presented in this fashion a formal baseline for this group could not be obtained. Instead, their correct use was recorded during the baseline phases of both groups of nouns. The entire first four sessions were used for the recording of baseline data for the Group I nouns. During part of sessions 1, 4, 7, 10, 13, 16, 19 and 21 the recording of baseline data for Group III nouns was accomplished.

TRAINING GROUP I NOUNS --

During sessions five through twenty-six the child was trained to correctly label the first group of ten noun objects comprised of apple, bell, box, book, doll, car, comb, shoe, T.V., and door.

Initially, the therapist held the objects to be labeled along side her own face and waited for eye contact. If eye contact was not established, the therapist snapped her fingers in front of the child's face after which she quickly drew her fingers up to her own eyes saying, "look at me." This was usually all that was required to obtain eye contact. Once eye contact was established, the therapist proceeded to verbally label the object while simultaneously modeling the appropriate sign for the object. The child was then given a five second time period in which she was to model the therapist's labeling behavior. Early in training all close approximations (taking the child's level of arm and hand coordination into account) were quickly reinforced with one of the primary reinforcers. This was followed by a shaping procedure in which the therapist moved the child's hands through the correct signing motion while simultaneously verbalizing the correct word. Correct approximations of the verbal and signed label received a primary reinforcer paired with vocal praise and a hug by the therapist.

As training proceeded, the child received reinforcement only for successively finer approximations of the therapist's model. When shaping was completed (immitation of the vocal and signed label with 90% accuracy for two consecutive sessions) the therapist gradually faded out the use of her model before the child's labeling response. The final step in training consisted of the therapist gradually fading in the question, "What is this?", while holding up the noun object. The child was then required to correctly label the object with the appropriate vocal and signed word. If the child responded incorrectly or with an echolalic response, (What is this?") the therapist turned away for a short time period and then initiated the procedure over

again.

As training progressed, two problems quickly arose which demanded immediate attention. The first problem developed when the child began to play with or spit out the primary reinforcer. To deal with this, it was decided to dispense with the use of primary reinforcers since the child appeared to be responding well to verbal praise accompanied by physical touch. This tactic was successful. The second problem was general misbehavior such as tantruming, head banging with the hand, and out of seat behavior. The therapist time out procedure described above for incorrect responses was insufficient in dealing with these behaviors. A stronger time out procedure, in which the child was placed face first in a corner for ten seconds was found to be extremely effective. Most times, the child returned to her seat and came right back to task.

TRAINING GROUP I VERBS --

During sessions 15 through 26 the child was trained to correctly pair in telegraphic form (verb-noun), the five verbs eat, ring, want, read and open with the appropriate nouns learned in Group I. Initially, the verbs were presented by themselves. The therapist obtained eye contact and then verbalized the verb while simultaneously modeling the appropriate sign. This was followed by a demonstration of the appropriate action. The child was then required to imitate the sign while verbalizing the word. A shaping procedure similar to the one used to train the Group I nouns was employed until the child was able to successfully imitate the vocal and signed model of the verbs, by the therapist, with 90% accuracy for two consecutive sessions.

Once this level of imitation was attained, the verbs were paired

with objects, previously taught in Group I, in telegraphic phrase form such as; "eat apple", "want doll", "open door", or "read book", etc. Immediate actions always resulted from the child's imitation. For example, when the child simultaneously verbalized and signed "watch T.V.", she was immediately allowed to turn on a small T.V. located in the therapy room. Since all of these actions appeared to be self-reinforcing, the only additional reinforcement given was verbal praise and touch by the therapist. Gradually the therapist faded out of the modeled prompt. First the object part of the phrase was dropped, and then the object was shown to the child by itself. All off task behaviors such as silliness, tantrums, etc. were dealt with by employing the same modified time-out procedure used in Group I training.

TRAINING GROUP III NOUNS --

During sessions 22 through 26, the child was trained to label the second group of ten noun objects which consisted of boy, girl, flower, bed, pants, toothbrush, water, cat, soap and ball. The training procedure employed was identical to that described for the Group I nouns.

FOLLOW-UP I --

The first of two follow-up sessions was conducted three months after training was discontinued. This session was conducted under similar conditions to therapy, i.e., same setting and therapist. The child was shown each of the twenty noun objects used in training followed by the question, "What is this?" The child was given five seconds to respond. If no response was forthcoming, the therapist prompted the child by modeling the correct sign only. The child was

then given another five second interval in which to respond. If no response was given, the therapist went on to the next object. Incorrect responses were like-wise ignored. After presentation of all twenty nouns, the therapist repeated the series a second time.

FOLLOW-UP II --

The second follow-up session was conducted approximately nine months after training was discontinued. This session was conducted in a different room from the original training with a therapist that the child had never seen before. Again the child was shown each of the twenty noun objects used in training followed by the question, "What is this?" The child was then given five seconds to respond. If no response was given, the new therapist prompted the child by modeling the correct sign only. The child was then given another five second interval in which to respond. If no response was given, the new therapist went on to the next object. Incorrect responses were ignored. After presentation of all twenty nouns, the new therapist repeated the series a second time.

RECORDING --

Each of the baseline, training and follow-up sessions were videotaped in their entirety. The video tapes were carefully analyzed through an event recording procedure, and a percentage of occurrence for the following behaviors was calculated:

1. Verbal echolalia - any immediate or delayed repetition of the question, "What is this?"
2. Prompted signed word - imitation of the sign without the vocal label.
3. Unprompted signed word - spontaneous production of the correct sign after presentation of the object.
4. Simultaneous prompted vocal and signed word -- production of the verbal and signed label in response to a vocal and/or signed prompt.

5. Simultaneous vocal and signed word -- production of the vocal and signed label in response to the presentation of the object.
6. Simultaneous prompted vocal and signed phrase -- production of the verb and noun phrase in response to a vocal and/or signed prompt.
7. Simultaneous vocal and signed phrase -- spontaneous production of the verb and noun phrase in response to the presentation of the object.
8. Prompted vocal word -- production of the vocal label in response to the signed prompt.
9. Unprompted vocal word -- spontaneous vocalization of the label in response to presentation of the object.
10. Prompted vocal phrase -- production of the vocal verb and noun phrase in response to the vocal and/or signed prompt.
11. Unprompted vocal phrase -- spontaneous vocalization of the verb and noun phrase in response to presentation of the object.
12. Irrelevant verbal utterances -- unrelated vocalizations, i.e., "go Titi," "go see Miss Crispy."

Reliability checks were made during sessions one and five by the therapist and this experimenter recording simultaneously from the video tapes of those sessions. The therapist and this experimenter could not see the scores being recorded by one another.

Reliabilities were calculated by dividing the number of agreements of occurrence by the number of agreements plus disagreements of occurrence. Reliabilities for each of the twelve behaviors recorded ranged from .91 to 1.00 for session one, and .84 to 1.00 for session five.

RESULTS

REDUCTION OF VERBAL ECHOLALIA:

Figure one presents the per cent of echolalic responses, as described above, during the baseline and treatment phases for each of the three training groups. Percentages were calculated by dividing the total number of echolalic responses by the total number of responses made by the subject during the session.

During the baseline phase for the Group I Nouns, the per cent of echolalic responses ranged from .84 to .93, resulting in an average of .89 per cent. With the onset of training in session five, a dramatic decrease in the production of echolalia can be seen. Over the twenty-two Group I training sessions the per cent of echolalia ranged from .04 to .27 resulting in an average of 17 per cent. Thus, an overall reduction in echolalia of 72 per cent was obtained during the training of labeling behavior for the Group I Nouns.

An identical effect also can be seen with the Group III Nouns. During the baseline phase the per cent of echolalic responses ranged from .71 to .94, resulting in an average of 81 per cent. With the onset of training in session 20, the per cent of echolalia is drastically reduced. Over the five Group III training sessions the per cent of echolalic responses ranged from .15 to .24, resulting in an average of 18 per cent. This amounted to an overall reduction of 63 per cent.

Due to the fact that a formal baseline for the training of the Group II Verbs could not be conducted it is impossible to show this reduction effect a third time. While this experimenter hesitates to

speculate, by employing the baseline per cents of echolalic occurrence for Groups I and III as a control for Group II, it is comforting to note that the production of echolalic responses remained low; averaging 17 per cent over the entire Group II training period.

INCREASE IN SIMULTANEOUS VOCAL AND SIGNED LABELING:

Figures Two and Three present the per cent of prompted and unprompted vocal and signed labels respectively. During the baseline phase for the Group I Nouns it can be seen that simultaneous vocal and signed labeling was nonexistent. With the initiation of training in session five, a marked increase in prompted vocal and signed labeling was demonstrated through the 14th session, at which time a gradual tapering off effect is noted. This resulted in an average increase in prompted vocal and signed labeling of 44 per cent over the first ten training sessions.

During session fourteen it can be seen that learning is truly taking place. It is at this point that the subject showed a dramatic increase in unprompted vocal and signed labeling while gradually decreasing the need for prompts by the therapist. This resulted in an average increase of 52 per cent in the production of unprompted vocal and signed labeling for sessions 14 through 26.

Further support for the results found in Group I training can be gained by examining the results of Group III training. Again, it can be seen that during baseline, the production of both prompted and unprompted simultaneous vocal and signed labeling is nonexistent. Once training began in session 22 we see an identical effect, but in an accelerated form. During sessions 22 through 24 an overall increase in simultaneous prompted vocal and signed labeling of 32 per

cent was obtained, followed by the same tapering off effect noted in Group I training. At this point learning again takes hold in session 25 and 26 as evidenced by the rapid rise in the production of unprompted simultaneous vocal and signed labeling by an overall average of 32 per cent.

INCREASE IN UNPROMPTED VOCAL LABELING:

Figure Four presents the per cent of unprompted vocal labels elicited by the subject. It can be seen that during the baseline phase, for the Group I Nouns, the production of vocal labels for those nouns was nonexistent. With the onset of training, an average increase of 11 per cent was obtained, characterized by a high degree of variability. It is felt that this variability is primarily the result of the high emphasis placed upon the development of the signing technique, in the subject by the therapist. Support for this view can be found in the results of the Group III training where less emphasis on the establishment of the signing technique was required. During the Group III training, an average increase in vocal labeling from two per cent during baseline to 18 per cent during training was obtained. Of note is the almost steady increase in the production of verbal labeling behavior without the variability found in the Group I training.

INCREASE IN SIMULTANEOUS VOCAL AND SIGNED TELEGRAPHIC PHRASING:

Figures Five and Six present the per cent of prompted and unprompted simultaneous vocal and signed telegraphic phrases respectively. During this phase of training the subject was required to appropriately pair each of the ten Group I Nouns with the correct

Group II Verb. As can be seen from both graphs Five and Six, the production of simultaneous vocal and signed phrasing was nonexistent during baseline. When phrase training began in session 15, a rapid increase in the production of prompted vocal and signed phrasing can be seen, followed by a more gradual increase in unprompted vocal and signed phrasing beginning with session 15. Group II training resulted in an average increase of 25 per cent in the production of prompted vocal and signed phrasing, and an average increase of 18 per cent in the production of unprompted vocal and signed phrasing.

FOLLOW-UP I:

After a three month time period in which training was discontinued, the subject was again required to label each of the Group I and Group III Nouns under the identical conditions employed in therapy. The following is a percentage breakdown for each type of response made by the subject:

1) echolalia - 9%
2) prompted vocal and signed labeling - 5%
3) unprompted vocal and signed labeling - 3%
4) prompted vocal labeling - 8%
5) unprompted vocal labeling - 75%

Since the identical conditions of therapy were maintained during Follow-Up I, this follow-up session primarily directs itself to the maintenance of the therapeutic changes over time. Analysis of this data leads to two major results. The first is a continuation in the low level of echolalic production over time as compared with the baseline conditions prior to therapy. The second, is the continuation of the labeling behavior, both prompted and unprompted over time.

Further exploration of the second result reveals that the use

of simultaneous vocal and signed labeling (prompted and unprompted) comprised 8% of the subject's responses in this follow-up phase. At the same time, vocal labeling comprised 83% of the subject's responses. Thus, while the use of the signing response faded out over time, the verbal labeling behavior maintained itself over the three month time period. If the subject was unable to give the correct labeling response, the therapist's signed prompt elicited either the correct vocal and signed label, or the correct vocal label without significant delay. Thus while the signing behavior extinguished in the subject, it continued to exert strong stimulus control over the verbal labeling behavior of the subject when employed as a prompt by the therapist.

FOLLOW-UP II:

Follow-up II was conducted approximately nine months after training was discontinued. Since the subject was confronted with a totally new therapist and setting, this follow-up procedure directs itself, not only to the question of maintenance over time, but also to the question of stimulus generalization across therapists and settings as well. The following is a percentage breakdown for each type of response made by the subject:

1) echolalia - 26%
2) prompted vocal labeling - 7%
3) unprompted vocal labeling - 52%
4) incorrect or no response to prompt - 15%

Analysis of this data, leads to three major results. The first result is the continued low level of echolalic production. Although the production of echolalia rose to 26% as compared with 9% during Follow-Up I, the production of this response was within the limits

obtained during the initial training, and significantly below the per cent of occurrence during baseline conditions. The second result obtained is the continued high percentage of both prompted and unprompted vocal labeling. Again this result is not as dramatic as that found in Follow-Up I, but is still highly significant in its own right. The third and final result is the demonstration of response generalization across settings and therapist as well as over time. The subject was able to respond favorably to someone she never met, in a totally new surrounding. Additional support for this finding can be gotten from reports given by the subject's parents (who were totally unaware of the training methods and procedures) who reported that the subject was "making strange motions with her hands" while she was verbalizing wants such as "watch T.V." at home.

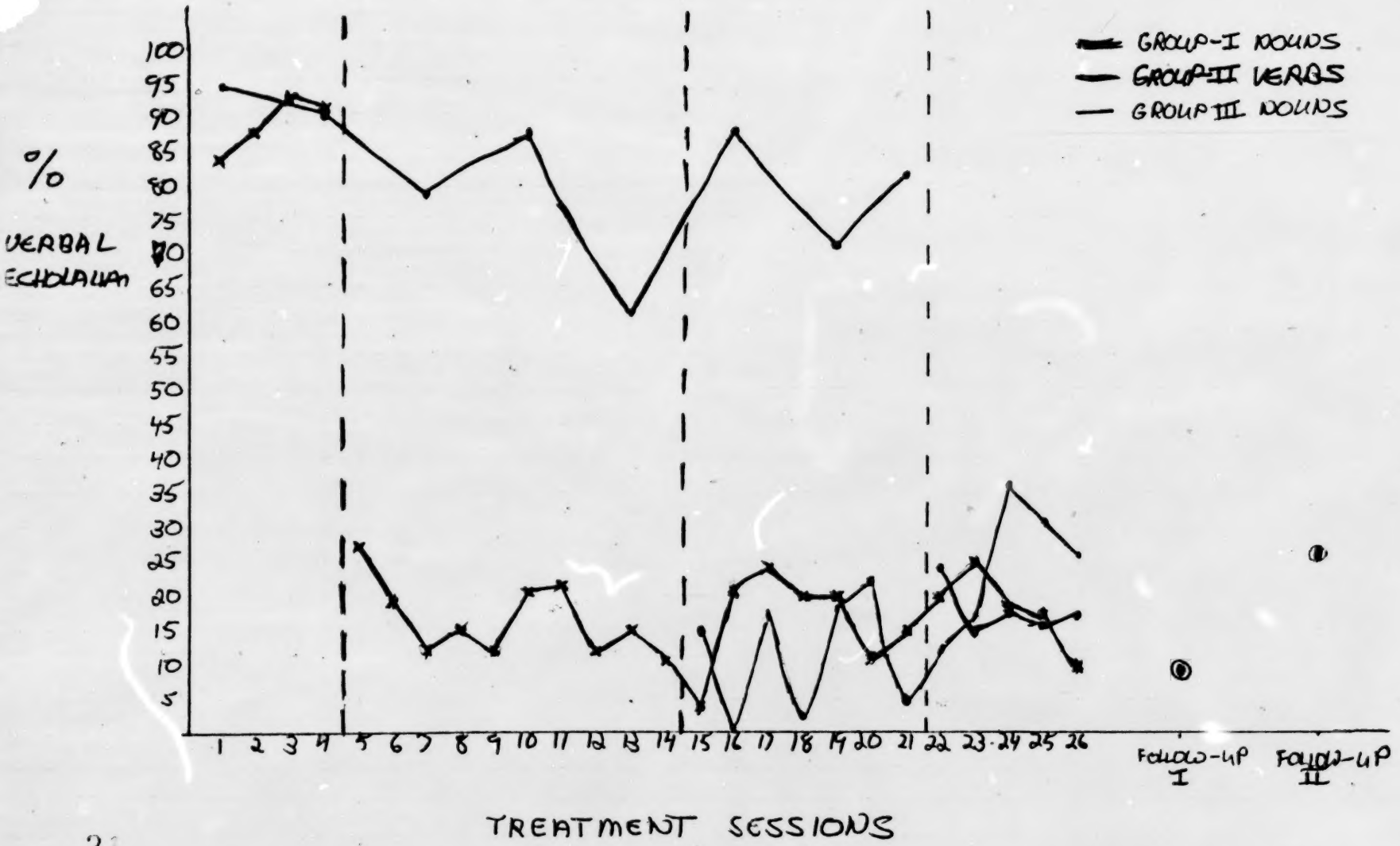

GROUP-I NOUNS
GROUP-II VERBS
GROUP III NOUNS
% VERBAL ECHOLALIA
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
FOLLOW-UP I
FOLLOW-UP II
TREATMENT SESSIONS

FIGURE I

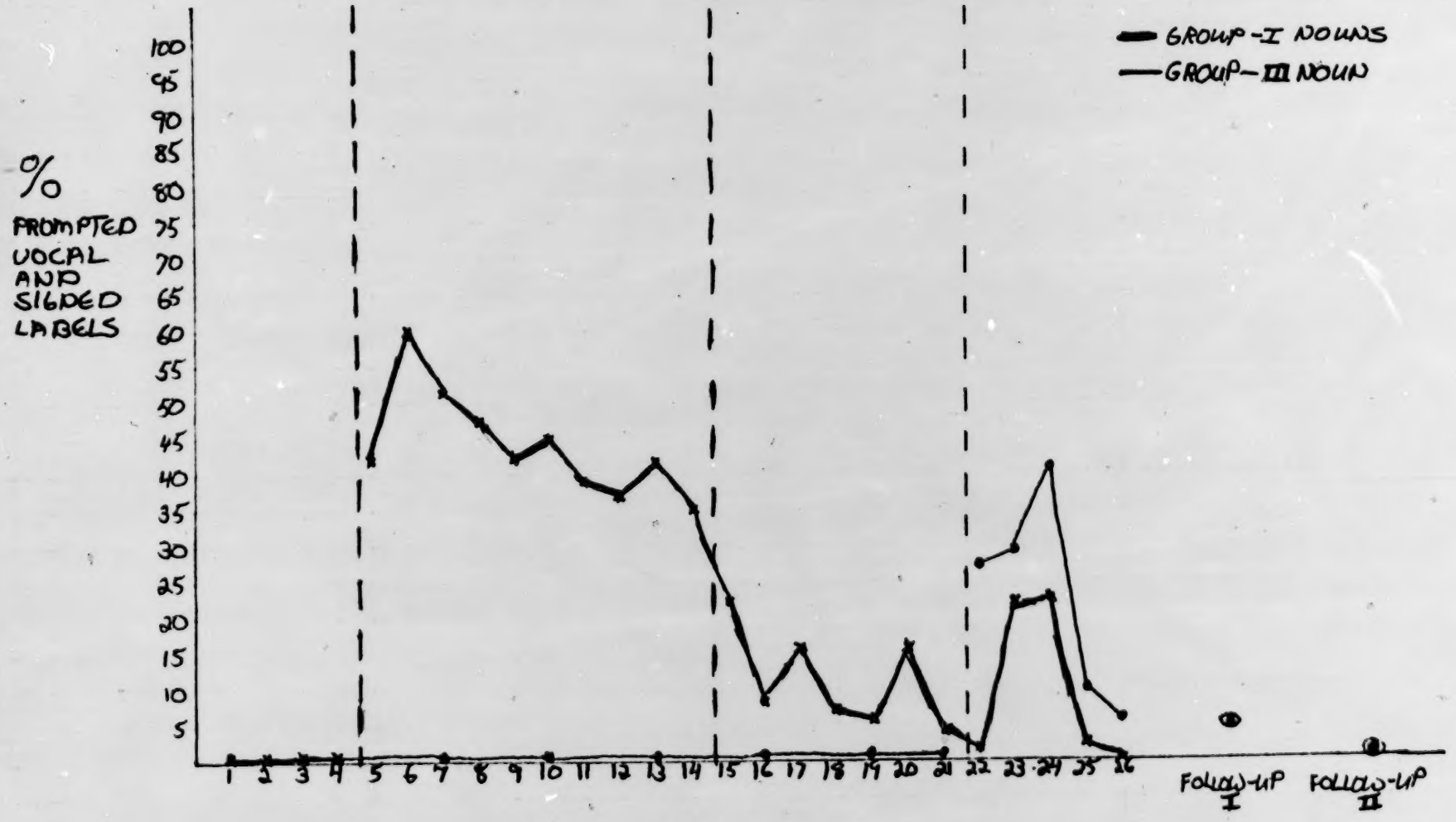

GROUP-I NOUNS
GROUP-III NOUN
%
PROMPTED
VOCAL
AND
SIGNED
LABELS
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
FOLLOW-UP I
FOLLOW-UP II
TREATMENT SESSIONS

FIGURE II

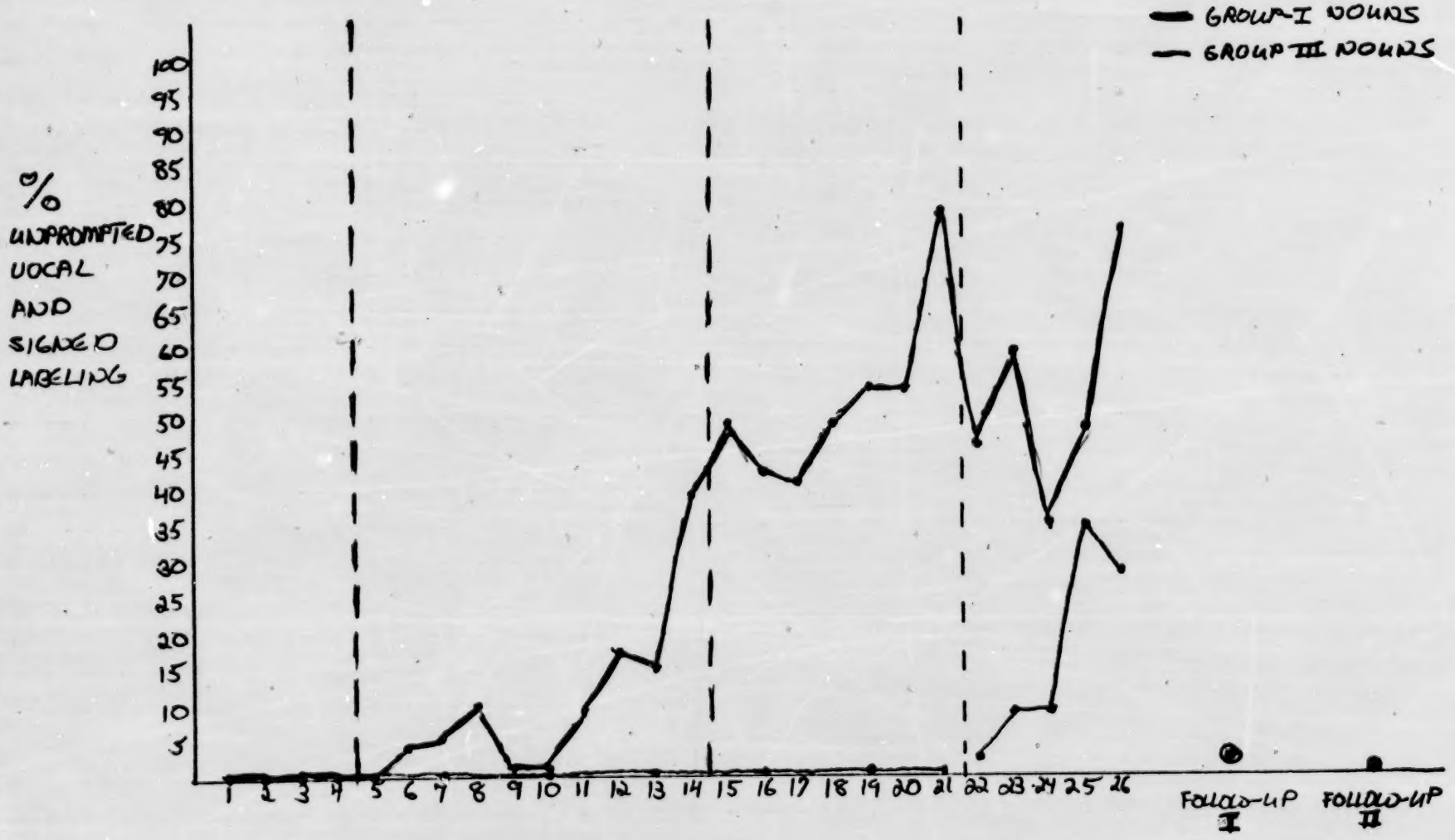

GROUP-I NOUNS
GROUP III NOUNS
% UNPROMPTED VOCAL AND SIGNED LABELING
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
FOLLOW-UP I
FOLLOW-UP II
TREATMENT SESSIONS

FIGURE III

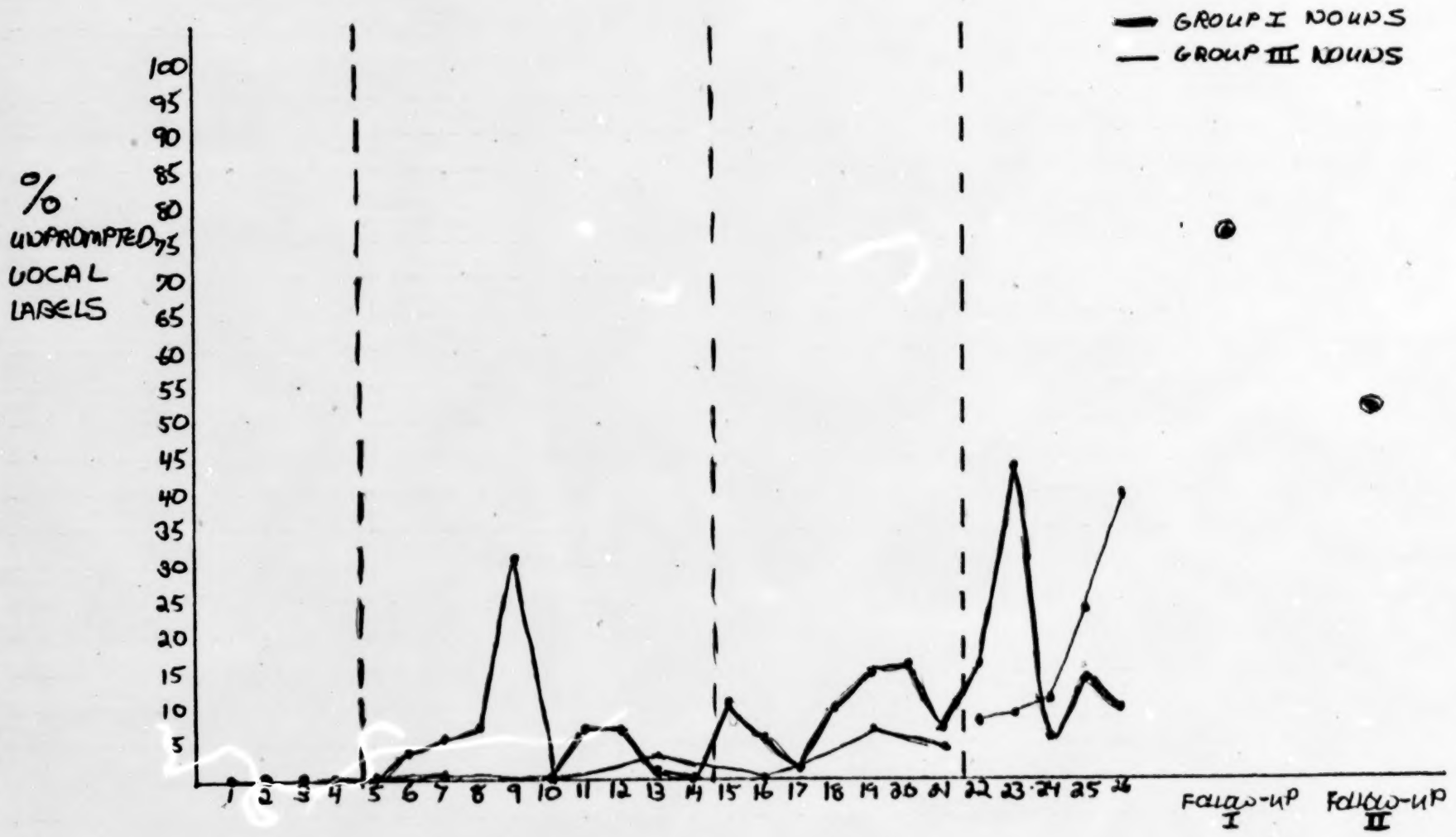
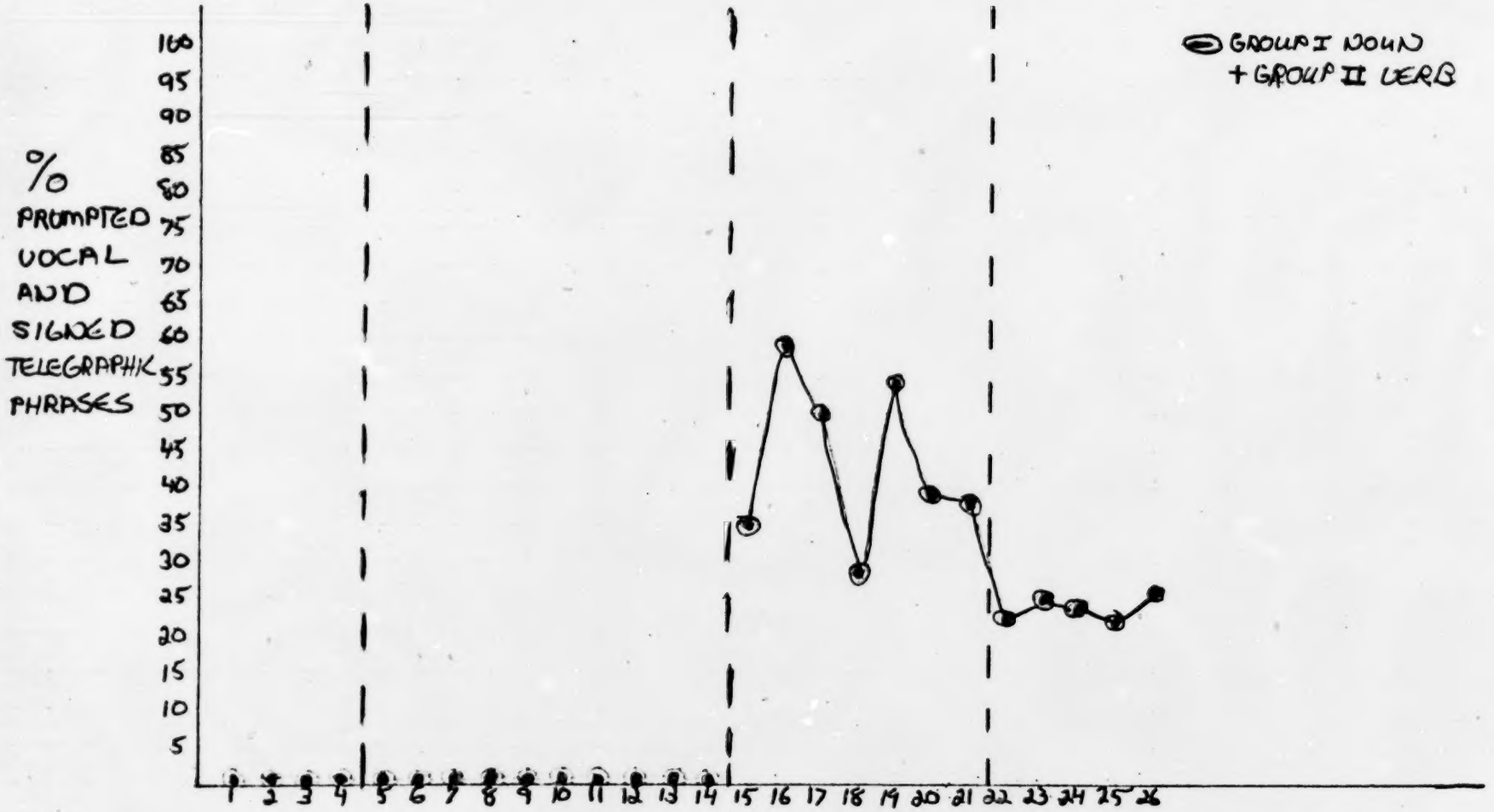

GROUP I NOUNS
GROUP III NOUNS
% UNPROMPTED VOCAL LABELS
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
FOLLOW-UP I
FOLLOW-UP II
TREATMENT SESSIONS

FIGURE IV


GROUP I NOUN
+ GROUP II VERB
% PROMPTED VOCAL AND SIGNED TELEGRAPHIC PHRASES
100
95
90
85
80
75
70
65
60
55
50
45
40
35
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25
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15
10
5
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
TREATMENT SESSIONS

FIGURE V

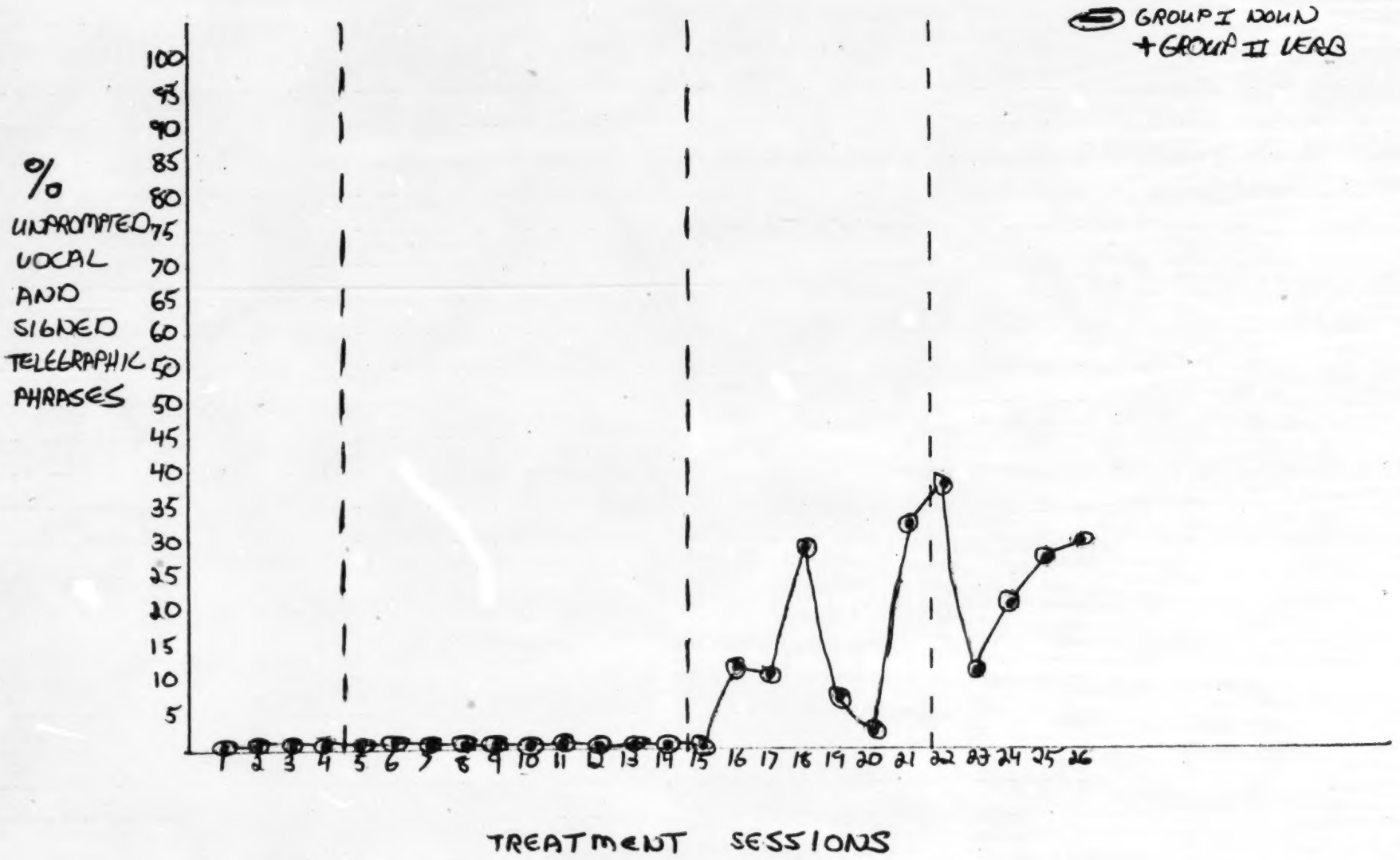
GROUP I DOWN
+GROUP II LEADS
%
UNPROMPTED
VOCAL
AND
SIGNED
TELEGRAPHIC
PHRASES
100
95
90
85
80
75
70
65
60
50
50
45
40
35
30
25
20
15
10
5
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
TREATMENT SESSIONS

FIGURE VI

DISCUSSION

In this study, the use of a modified multiple baseline design across behaviors appears to indicate that the training procedures involving the use of behavior modification techniques (modeling, differential reinforcement, shaping, fading, time out for errors and misbehavior, and stimulus control) in conjunction with a total communication approach was effective in training verbal labeling behavior and rudimentary telegraphic speech while simultaneously decreasing the production of echolalia in an autistic child. The results of the two follow-up sessions demonstrated the maintenance of the training effects over time as well as generalization of the effects across settings and therapists.

After reviewing the results of this study, certain other findings which were not adequately controlled for in the initial design were discovered. Due to this lack of control, these findings could not be validly placed in the results section of this paper, but will be informally discussed here as they are felt to be important enough to warrant consideration.

The first of the findings to be discussed in this section has to do with response generalization, i.e., the extent to which changes in a limited range of behaviors effected changes in a larger range of behavior. Put more simply, the extent to which the subject began to use language creatively in a meaningful fashion. As stated above, this type of verbal behavior was not formally recorded, but did appear to take place. For example, the subject was trained to use the tele-

graphic phrase, "want doll" in order to obtain the doll. With time, the subject spontaneously learned to use this phrase in various untrained forms such as, "want book", "want cookie", "want car", etc.

A second effect noted in this study was the tremendous reinforcing power physical touch and verbal praise had on this subject. After training began, the subject began to repeatedly play with or spit out the chocolate chips and bite size cookies used as primary reinforcers. This quickly developed into an attention seeking ploy by the subject, which if allowed to continue would jeopardize training. After spending many frustrating hours trying to think of a suitable nondistracting reinforcer and coming up empty, it was decided to use physical touch and verbal praise alone. Much to this experimenter's delight, these appeared to possess powerful reinforcing qualities when used contingently with this "autistic" child. As a result, it is felt that further research using physical touch and verbal praise as contingent reinforcers with autistic children and children in general is warranted.

A third finding noted in this study centers around the amount of therapeutic time spent in actual training. As stated in the review section, the actual time spent training children in many of the studies discussed makes the implementation of the techniques impractical for use in many public schools that treat severely disturbed children. In this study, the subject was seen by the therapist for twenty minutes three times a week. This therapeutic schedule is very workable in the public school setting, and based upon the results obtained is a treatment method that is not only effective, but practical as well.

The fourth and final area to be discussed in this section is related to the use of echolalic language behavior by many autistic

and schizophrenic children. Lovaas and Newsom (1976) in a review of behavior modification techniques with psychotic children present studies from their laboratory (Lovaas, Schreibman, Kogel, and Rehm, 1971; Lovaas and Schreibman, 1971; Koegel and Wilhelm, 1973; and Reynolds, Newsom, and Lovaas, 1974) which provide substantial evidence for the conclusion that many autistic children attend to enviornmental stimuli in a highly selective manner. Thus, their behavior comes under the control of a very limited number of stimuli. Conversely, many stimuli which would normally be considered highly salient become nonfunctional in the regulation of the autistic child's behavior. Further, Lovaas and his co-workers have found that this stimulus overselectivity occurred not only when the autistic child was presented with stimuli in two senory modalities (crossmodal), but when presented with complex or multiple-cue input within one modality as well.

Based upon the research of Lovaas, et. al., and observations made during this study, it is hypothesized that the use of echolalia by autistic children may serve as a means by which the autistic child helps himself process the speech of others. If the child is truly having difficulty attending to all the appropriate stimuli associated with another's speech (i.e., vocalizations, facial expressions, lip movements and other environmental cues that have contextual significance), and as a result requires the use of selective attention, it would seem logical that the child may selectively attend to a single mode (auditory vocalizations) and repeat that stimulus in echolalic fashion as an aide in processing.

Taking this hypothesis together with the finding that proprioceptive

tive-kinesthetic sensory feedback is highly reinforcing to autistic children (Lovaas, Litrownik, and Mann, 1971), one can hypothetically explain the result of decreased echolalia found in this study. By training the child to use signs simultaneously with speech in a rhythmic fashion, a situation is created in which the correct pairing of a simultaneous verbal and signed label with the appropriate object stimulus becomes not only socially reinforcing, but self-reinforcing as well. At the same time this training procedure is aiding the child to integrate sensory information from the auditory, visual and kinesthetic senses, thus alleviating the need for echolalia. It must be stated that this explanation is merely hypothetical, but would seem to warrant closer attention.

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